Abstracts

The Propagation Characteristics of Signal Lines in a Mesh-Plane Environment

B.J. Rubin. "The Propagation Characteristics of Signal Lines in a Mesh-Plane Environment." 1984 Transactions on Microwave Theory and Techniques 32.5 (May 1984 [T-MTT]): 522-531.

This paper investigates the propagation characteristics of signal lines situated between a pair of mesh reference planes in a homogeneous dielectric. These mesh reference planes, which form the heart of high-performance multichip modules, provide a transmission-line environment for the signals carried between integrated circuit chips. A numerical solution that employs a set of rooftop functions to represent the current density is developed and used to find the propagation velocity and characteristic impedance in mesh plane structures where the conductors have zero thickness and finite sheet resistance. The telegraphist's equations are shown to apply, and are used to find the capacitance and inductance matrices in coupled fine configurations. The near- and far-end crosstalk are calculated when the coupled lines are on the same, and on opposite, sides of a mesh plane. The presence of conductors which run in a direction orthogonal to the signal lines, whether as an array of crossing signal lines or as part of the mesh planes, is shown to significantly affect only the capacitive parameters. The influence of such orthogonal lines on the propagation velocity, characteristic impedance, and crosstalk are given, and a detailed plot clearly indicates the circulating current flow in these lines.

❑ Return to main document.